

	sq. km	sq. mi	FIA Plots
Area of Region	14,202	5,483.6	441

Species Information

The columns below provide brief summaries of the species associated with the region and described in the table on the next pages. Definitions are provided in the Excel file for this region.

Genus	Species	Abundance		Model		Potential Change in Habitat Suitability		Capability to Cope or Persist		Migration Potential				
		Abundant	Common	High	Medium	Reliability	Adaptability	Scenario RCP45	Scenario RCP85	Scenario RCP45	Scenario RCP85	SHIFT RCP45	SHIFT RCP85	
Ash	3													
Hickory	5													
Maple	6	6		19	27	Increase	26	30	Very Good	11	12	Likely	2	2
Oak	16	27		30	50	No Change	17	12	Good	18	19	Infill	11	14
Pine	6	45		38	14	Decrease	26	27	Fair	14	12	Migrate	5	6
Other	42	17		9		New	12	13	Poor	7	11			
	78	95		96	91	Unknown	15	14	Very Poor	17	14		18	22
							96	96	FIA Only	4	4			
									Unknown	6	5			
										77	77			

Potential Changes in Climate Variables

Temperature (°F)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	55.1	56.9	59.2	59.5	
Average	CCSM85	55.1	57.4	60.1	63.2	
	GFDL45	55.1	58.2	60.4	61.3	
	GFDL85	55.1	58.1	61.4	65.3	
	HAD45	55.1	57.8	61.2	62.6	
	HAD85	55.1	58.3	62.9	67.1	
Growing Season	CCSM45	71.1	72.8	74.9	75.6	
	CCSM85	71.1	73.4	76.2	80.2	
May—Sep	GFDL45	71.1	74.6	77.3	78.7	
	GFDL85	71.1	74.7	78.8	83.2	
	HAD45	71.1	74.3	77.6	79.5	
	HAD85	71.1	74.8	81.1	85.3	
Coldest Month	CCSM45	30.0	31.5	33.1	33.6	
	CCSM85	30.0	33.0	33.9	35.6	
Average	GFDL45	30.0	34.1	34.3	34.7	
	GFDL85	30.0	32.4	33.4	34.1	
	HAD45	30.0	31.1	33.5	33.7	
	HAD85	30.0	32.4	34.5	36.3	
Warmest Month	CCSM45	76.5	78.2	79.5	80.0	
	CCSM85	76.5	78.9	80.7	82.5	
Average	GFDL45	76.5	79.8	81.5	82.5	
	GFDL85	76.5	80.3	82.8	85.4	
	HAD45	76.5	80.5	83.2	84.1	
	HAD85	76.5	82.2	86.7	88.9	

Precipitation (in)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	46.8	47.4	52.0	50.6	
Total	CCSM85	46.8	50.5	51.3	54.8	
	GFDL45	46.8	53.0	55.7	58.5	
	GFDL85	46.8	51.6	56.6	59.8	
	HAD45	46.8	47.7	50.3	49.6	
	HAD85	46.8	47.9	45.7	49.8	
Growing Season	CCSM45	20.5	19.9	21.7	20.8	
	CCSM85	20.5	20.8	19.8	20.8	
May—Sep	GFDL45	20.5	23.2	22.7	23.4	
	GFDL85	20.5	22.1	22.7	23.2	
	HAD45	20.5	20.2	18.8	18.8	
	HAD85	20.5	20.0	16.1	16.5	

NOTE: For the six climate variables, four 30-year periods are used to indicate six potential future trajectories. The period ending in 2009 is based on modeled observations from the PRISM Climate Group and the three future periods were obtained from the NASA NEX-DCP30 dataset. Future climate projections from three models under two emission scenarios show estimates of each climate variable within the region. The three models are CCSM4, GFDL CM3, and HadGEM2-ES and the emission scenarios are the 4.5 and 8.5 RCP. The average value for the region is reported, even though locations within the region may vary substantially based on latitude, elevation, land-use, or other factors.

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Section 223B

EcoMap 2007
Climate Change Atlas Tree Species

USDA Forest Service
Northern Research Station
Landscape Change Research Group
Iverson, Peters, Prasad, Matthews

Current and Potential Future Habitat, Capability, and Migration

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
sugar maple	Acer saccharum	WDH	High	87.2	1495.4	10.5	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	1
yellow-poplar	Liriodendron tulipifera	WDH	High	76	1051.1	8.2	Lg. dec.	Lg. dec.	High	Abundant	Good	Good			1	2
white oak	Quercus alba	WDH	Medium	69.1	753.2	6.3	No change	No change	High	Abundant	Very Good	Very Good			1	3
red maple	Acer rubrum	WDH	High	70.6	748.7	6.1	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	4
eastern redcedar	Juniperus virginiana	WDH	Medium	52.4	656.8	7.5	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	5
American beech	Fagus grandifolia	WDH	High	65.8	513.0	4.6	Lg. dec.	Lg. dec.	Medium	Abundant	Fair	Fair			0	6
sassafras	Sassafras albidum	WSL	Low	72.3	472.3	3.7	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	7
black oak	Quercus velutina	WDH	High	55.7	433.3	5.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	8
chestnut oak	Quercus prinus	NDH	High	31.8	411.0	9.3	Sm. dec.	Lg. dec.	High	Common	Fair	Fair			1	9
pignut hickory	Carya glabra	WDL	Medium	61.6	365.1	3.6	No change	Sm. dec.	Medium	Common	Fair	Poor			1	10
white ash	Fraxinus americana	WDL	Medium	60.1	346.8	3.3	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	11
northern red oak	Quercus rubra	WDH	Medium	55.9	299.4	3.2	No change	No change	High	Common	Good	Good			1	12
Virginia pine	Pinus virginiana	NDH	High	24.6	282.5	6.2	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	13
sycamore	Platanus occidentalis	NSL	Low	36.3	278.8	4.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	14
black cherry	Prunus serotina	WDL	Medium	60.7	266.6	2.9	Sm. inc.	No change	Low	Common	Fair	Poor			1	15
shagbark hickory	Carya ovata	WSL	Medium	50.1	220.2	1.9	No change	No change	Medium	Common	Fair	Fair			1	16
American elm	Ulmus americana	WDH	Medium	48.3	212.6	2.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	17
blackgum	Nyssa sylvatica	WDL	Medium	56.9	197.7	2.1	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	18
black locust	Robinia pseudoacacia	NDH	Low	20.8	188.1	4.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	19
bitternut hickory	Carya cordiformis	WSL	Low	38.6	171.6	3.1	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	20
black walnut	Juglans nigra	WDH	Low	41.4	170.1	2.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	21
post oak	Quercus stellata	WDH	High	11.5	163.6	8.2	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	22
chinkapin oak	Quercus muehlenbergii	NSL	Medium	29.3	157.4	3.4	No change	No change	Medium	Common	Fair	Fair			1	23
green ash	Fraxinus pennsylvanica	WSH	Low	34	149.7	2.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	24
hackberry	Celtis occidentalis	WDH	Medium	32.1	146.2	3.1	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	25
boxelder	Acer negundo	WSH	Low	18.1	132.1	3.9	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	26
flowering dogwood	Cornus florida	WDL	Medium	48.3	121.6	1.4	No change	No change	Medium	Common	Fair	Fair			1	27
slippery elm	Ulmus rubra	WSL	Low	46.4	121.5	1.8	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	28
mockernut hickory	Carya alba	WDL	Medium	28.3	102.2	2.2	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	29
scarlet oak	Quercus coccinea	WDL	Medium	28.6	94.4	2.5	No change	Sm. dec.	Medium	Common	Fair	Poor			1	30
eastern redbud	Cercis canadensis	NSL	Low	34.3	90.9	1.5	No change	No change	Medium	Common	Fair	Fair			1	31
sweetgum	Liquidambar styraciflua	WDH	High	14.4	57.6	2.1	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	32
sourwood	Oxydendrum arboreum	NDL	High	12.5	56.2	2.0	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	1	33
American basswood	Tilia americana	WSL	Medium	10.6	49.1	1.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	34
common persimmon	Diospyros virginiana	NSL	Low	20	49.0	1.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	35
eastern white pine	Pinus strobus	WDH	High	6.2	46.8	5.5	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	36
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	24.5	38.6	0.8	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	37
Osage-orange	Maclura pomifera	NDH	Medium	7.3	36.0	4.1	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	1	38
silver maple	Acer saccharinum	NSH	Low	3.5	35.1	5.4	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	39
red mulberry	Morus rubra	NSL	Low	14	33.9	1.6	No change	Sm. inc.	Medium	Rare	Poor	Fair			1	40
shingle oak	Quercus imbricaria	NDH	Medium	13	29.8	3.9	No change	Sm. dec.	Medium	Rare	Poor	Very Poor	Infill +		1	41
ailanthus	Ailanthus altissima	NSL	FIA	5.1	27.9	3.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	42
eastern cottonwood	Populus deltoides	NSH	Low	2.4	27.4	2.2	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	43
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	17.2	25.9	0.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	44
pin oak	Quercus palustris	NSH	Low	7.3	24.5	1.8	No change	No change	Low	Rare	Very Poor	Very Poor			0	45
southern red oak	Quercus falcata	WDL	Medium	6.6	23.4	3.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	46
winged elm	Ulmus alata	WDL	Medium	10.6	21.5	1.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	47



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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
shortleaf pine	Pinus echinata	WDH	High	3.3	20.3	3.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	48
yellow buckeye	Aesculus flava	NSL	Low	5.2	19.4	2.0	Sm. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	49
Shumard oak	Quercus shumardii	NSL	Low	8	18.3	1.6	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	1	50
bigtooth aspen	Populus grandidentata	NSL	Medium	7	18.0	1.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	51
honeylocust	Gleditsia triacanthos	NSH	Low	5.3	18.0	1.5	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	52
shellbark hickory	Carya laciniosa	NSL	Low	9.4	16.3	1.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	53
pawpaw	Asimina triloba	NSL	Low	11.6	16.2	1.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	54
red pine	Pinus resinosa	NSH	Medium	1.2	15.9	8.9	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	55
blue ash	Fraxinus quadrangulata	NSL	Low	4.2	14.8	2.7	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	56
Ohio buckeye	Aesculus glabra	NSL	Low	6.1	11.9	1.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	57
swamp white oak	Quercus bicolor	NSL	Low	2.1	7.5	3.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	58
northern catalpa	Catalpa speciosa	NSHX	FIA	0.7	7.3	3.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	59
northern pin oak	Quercus ellipsoidalis	NSH	Medium	0.5	7.2	7.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	60
black willow	Salix nigra	NSH	Low	2	7.0	1.8	No change	Lg. inc.	Low	Rare	Very Poor	Fair		Infill +	2	61
river birch	Betula nigra	NSL	Low	1.5	6.5	1.6	No change	Sm. inc.	Medium	Rare	Poor	Fair		Infill +	2	62
serviceberry	Amelanchier spp.	NSL	Low	6	6.4	0.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	63
swamp chestnut oak	Quercus michauxii	NSL	Low	1.4	5.7	4.1	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	64
black maple	Acer nigrum	NSH	Low	2.1	4.8	2.3	Very Lg. dec.	Lg. dec.	High	Rare	Lost	Poor			0	65
Siberian elm	Ulmus pumila	NDH	FIA	0.7	4.1	5.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	66
blackjack oak	Quercus marilandica	NSL	Medium	0.9	3.1	0.8	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	67
butternut	Juglans cinerea	NSLX	FIA	0.7	2.4	3.5	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	68
cucumbertree	Magnolia acuminata	NSL	Low	1.9	2.1	0.9	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	69
paulownia	Paulownia tomentosa	NSL	FIA	0.7	2.0	2.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	70
Norway spruce	Picea abies	NSH	FIA	0.7	1.7	2.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	71
bur oak	Quercus macrocarpa	NDH	Medium	0.7	1.3	0.6	Very Lg. dec.	Sm. dec.	High	Rare	Lost	Poor		Infill +	2	72
Kentucky coffeetree	Gymnocladus dioicus	NSLX	FIA	0.3	1.3	0.7	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	73
sugarberry	Celtis laevigata	NDH	Medium	1.2	1.2	0.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	74
pitch pine	Pinus rigida	NSH	High	3.4	0.8	0.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	75
rock elm	Ulmus thomasii	NSLX	FIA	0.8	0.8	0.3	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	76
striped maple	Acer pensylvanicum	NSL	Medium	0.7	0.4	0.5	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			0	77
Scots pine	Pinus sylvestris	NSH	FIA	0.5	0.3	0.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	78
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	79
red spruce	Picea rubens	NDH	High	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	80
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	81
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	82
mountain maple	Acer spicatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	83
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	84
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	85
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	86
black ash	Fraxinus nigra	WSH	Medium	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat			3	87
silverbell	Halesia spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	88
American holly	Ilex opaca	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	89
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	90
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	91
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	92
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	93
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	94



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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
live oak	<i>Quercus virginiana</i>	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	95
cedar elm	<i>Ulmus crassifolia</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	96